



(51) International Patent Classification:
H01R 13/635 (2006.01) *G06K 13/08* (2006.01)

(21) International Application Number:
PCT/US2010/026302

(22) International Filing Date:
5 March 2010 (05.03.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2009-052204 5 March 2009 (05.03.2009) JP
2009-052388 5 March 2009 (05.03.2009) JP

(71) Applicant (for all designated States except US):
MOLEX INCORPORATED [US/US]; 2222 Wellington Court, Lisle, Illinois 60532 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MATSUMOTO, Yasuyoshi** [JP/JP]; Heights-Ichikawa-Daisan #305, 12-19 Chuo 6-chome, Yamato-shi, Kanagawa 242-0021 (JP). **TOMITA, Mitsuhiro** [JP/JP]; 6-1-719, Nishi-tsuruma, 3-chome, Yamato-shi, Kanagawa 242-0005 (JP).

(74) Agents: **MORELLA, Timothy M.** et al.; Molex Incorporated, 2222 Wellington Court, Lisle, Illinois 60532 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: CARD CONNECTOR

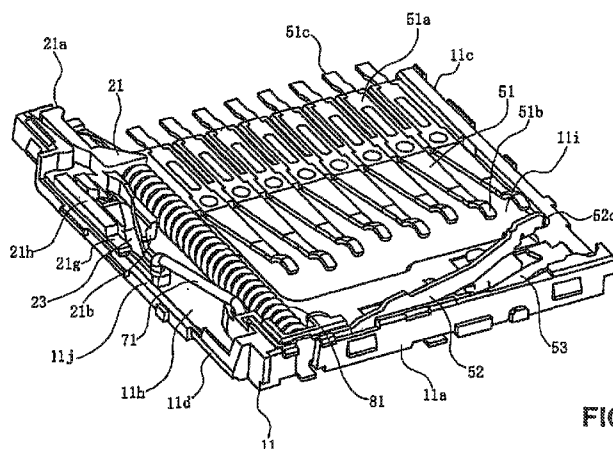


FIG. 3

(57) Abstract: A card connector comprises a housing, connection terminals, a card guide mechanism and a cover member. The housing is configured to accommodate therein a card which is provided with terminal members. The connection terminals are mounted in the housing and configured to be capable of coming into contact with the terminal members of the card. The card guide mechanism is provided with a slide member configured to slide while holding the card inserted into the housing, and an urging member configured to urge the slide member in a direction opposite to an insertion direction of the card. The cover member is mounted on the housing and configured to cover at least the slide member and a portion of the card inserted into the housing.

CARD CONNECTOR

REFERENCE TO RELATED APPLICATIONS

[0001] The Present Application claims priority of prior-filed Japanese Patent Application Nos. 2009-052204, entitled "Card Connector," and filed 05 March 2009, and 2009-052388, entitled "Card Connector," and filed 05 March 2009, the contents of which are fully incorporated in their entireties herein.

BACKGROUND OF THE PRESENT APPLICATION

[0002] The Present Application relates, generally, to a card connector, and, more particularly, to a card connector having a braking force of an appropriate magnitude that can be constantly stably exerted at an appropriate timing regardless of the dimensional accuracy of the card, thereby allowing the card to be stably and certainly ejected at an appropriate speed while preventing the card from springing out from the card connector.

[0003] Typically, electronic devices are provided with a card connector in order to use a variety of memory cards. From the viewpoint of usability, card connectors typically have a push-push structure that requires an operation of pushing a memory card when the memory card is inserted therein and also when ejected therefrom. However, in a push-push type card connector, since the memory card is slid by a repulsive force of a spring generated when the card is ejected, the moving speed of the card or a slide member holding the card becomes rather high, so that there might occur an unfavorable state such that the card springs out of the card connector or the slide member collides against a stopper member and an impact is applied thereto. In this regard, a proposal has already been made to provide a technique that uses a decelerating device to decelerate the card or the slide member when the card is ejected. An example of such a card connector is disclosed in Japanese Patent Application No. 2008-181792.

[0004] Fig. 8 illustrates an exploded perspective view of a conventional card connector. Referring to Fig. 8, housing 811 of a card connector, formed of an insulating material, is provided with a plurality of connection terminals 851, formed of metal. Shell 861 of the card connector, formed of a metal plate, is attached to an upper side of housing 811. Memory card 901 is inserted into a space defined between shell 861 and housing 811 so that non-illustrated contact pads of memory card 901 contact corresponding connection terminals 851.

[0005] In the example illustrated, the card connector is a so-called push-push type connector, provided with a guide mechanism for permitting ejection of memory card 901 therefrom. The guide mechanism is provided with slide member 821, configured to be engaged with memory card 901 to slide together with memory card 901 and coil spring 881 that urges slide member 821 in a direction for ejecting memory card 901.

[0006] Guide mechanism-accommodation groove portion 811h is formed in one side portion of housing 811, so that slide member 821 is slidably accommodated in guide mechanism-accommodation groove portion 811h. Cam groove 823 of a heart cam mechanism is provided on an upper surface of slide member 821, and one end of pin member 871 of the heart cam mechanism is provided to be engaged with cam groove 823. The other end of pin member 871 is provided for being locked in guide mechanism-accommodation groove portion 811h at a position in the vicinity of stopper portion 811g. Pin member 871 is held by being urged downward from an upper side by leaf spring member 865 of shell 861.

[0007] Slide member 821 is further provided with first engagement portion 821c configured to come into engagement with a front end of memory card 901, projecting portion 824 configured to come into engagement with a front end of convex engagement portion 911 of memory card 901, second engagement portion 821d configured to come into engagement with concave engagement portion 912 of memory card 901, and abutting portion 821e configured to come into contact with stopper portion 811g so as to stop slide member 821.

[0008] When a user inserts and pushes memory card 901 into housing 811, memory card 901 is pushed into an innermost side of housing 811. Then, first engagement portion 821c, projecting portion 824 and second engagement portion 821d of slide member 821 come into engagement with the front end, convex engagement portion 911 and concave engagement portion 912 of memory card 901, respectively. Slide member 821 is inwardly moved toward the innermost side of housing 811, together with memory card 901, while resisting against a repulsive force of coil spring 881. Further, when one end of pin member 871 is latched to cam groove 823 by the action of the heart cam to result in stopping of slide member 821, memory card 901 comes to stop there under a state where it is inserted into housing 811.

[0009] Next, when the user pushes memory card 901 to eject memory card 901 out of housing 811, one end of pin member 871 is released from the state of being latched to cam groove 823. With this operation, slide member 821 is set free and is therefore moved toward the front side

together with memory card 901 by the force exerted by coil spring 881, and thus, memory card 901 is ejected from housing 811.

[0010] Guide mechanism-accommodation groove portion 811h is formed, in a side wall thereof, with cantilever-like brake shoe 819 having restoring properties. Moreover, upwardly pressing springs 852R, 852L are arranged on both sides of the plurality of connection terminals 851. A top surface of brake shoe 819 is pressed against a side surface of projecting portion 824 of slide member 821, and the upper surfaces of upwardly pressing springs 852R, 852L are pressed against a lower surface of memory card 901.

[0011] As a result, the moving speed of slide member 821 and memory card 901 is reduced by brake shoe 819 and upwardly pressing springs 852R, 852L when memory card 901 is ejected from housing 811. Therefore, memory card 901 is prevented from springing out of the card connector and/or abutting portion 821e of slide member 821 is prevented from colliding against stopper portion 811g while mitigating occurrence of a shock.

[0012] Nevertheless, since upwardly pressing springs 852R, 852L need to be provided as additional separate members, it may lead to an increase in the number of components and in the manufacturing cost. Moreover, in recent years, with the fast trend toward lowering the manufacturing cost, the finishing accuracy of the outline of memory card 901 tends to decrease and the dimensional accuracy of the top surface of memory card 901 also tends to decrease. That is to say, even an identical type of memory cards 901 often exhibits a change in thickness dimension thereof as well as in the degree of surface roughness or smoothness thereof. For this reason, if memory card 901 has a large thickness dimension, the pressing force of upwardly pressing springs 852R, 852L becomes stronger while causing an increase in a braking force beyond an expected value. As a result, the ejection of memory card 901 is apt to be prevented. On the other hand, if memory card 901 has a small thickness dimension, the pressing force of upwardly pressing springs 852R, 852L is weakened while reducing the braking force to a value below the expected value. As a result, memory card 901 may spring out from the card connector. Similarly, if the top surface of memory card 901 is rough, a large braking force beyond the expected value appears, so that the ejection of memory card 901 is prevented. On the other hand, if the top surface of memory card 901 is smooth, the braking force becomes smaller than the expected value, so that memory card 901 may spring out from the card connector.

[0013] Brake shoe 819 needs to be provided with the restoring properties and be formed into a cantilever-like shape in the side wall of guide mechanism-accommodation groove portion 811h. On the other hand, in recent years, with the rapid miniaturization of electronic devices or apparatuses, memory card 901 and card connectors have become rapidly miniaturized. For this reason, it may be extremely difficult to form brake shoe 819 having a very small size, capable of constantly exerting stable spring characteristics, and having an extremely complicated cantilever-like shape, in the side wall of guide mechanism-accommodation groove portion 811h of housing 811 that is manufactured by integral molding with an insulating material such as synthetic resin; even if possible, it must bring about an increase in the manufacturing cost.

SUMMARY OF THE PRESENT APPLICATION

[0014] Therefore, it is an object of the Present Application to solve the above-described problems encountered by the conventional card connector and to provide a card connector which is provided with such a configuration that a convex portion is formed on an upper surface of a slide member configured to slide while holding a card, and a cantilever-like leaf spring member formed in a shell is brought into tight contact with the convex portion so as to apply a brake to the slide member. As a result, a braking force of an appropriate magnitude can be constantly stably exerted at an appropriate timing regardless of the dimensional accuracy of the card. Moreover, the card can be stably and certainly ejected at an appropriate speed while preventing the card from springing out from the card connector. Accordingly, the card connector can be easily produced to have a simple structure at a low cost with high reliability thereof without causing an increase in the number of components.

[0015] Therefore, in accordance with the Present Application, there is provided a card connector comprising: a housing configured to accommodate therein a card which is provided with terminal members; connection terminals mounted in the housing and configured to be capable of coming into contact with the terminal members of the card; a card guide mechanism which is provided with a slide member configured to slide while holding therein the card inserted into the housing and an urging member configured to urge the slide member in a direction opposite to an insertion direction of the card, and is configured to hold the card at a lock position thereof to thereby maintain a state where the terminal members of the card are in contact with the connection terminals, and when the card is moved in the insertion direction to reach an over-

stroke position thereof by a pushing operation to push the card being held at the lock position in the insertion direction, to thereby move the card in the direction opposite to the insertion direction from the over-stroke position by an urging force of the urging member to be ejected therefrom; and a cover member mounted on the housing and configured to cover at least the slide member and a portion of the card inserted into the housing, wherein: the cover member is provided with a cantilever-like brake member which has a base end portion thereof being integrally connected to the cover member and a free end thereof being formed with a sliding portion; and the slide member is provided with a brake-receipt portion containing a braking face capable of permitting the sliding portion to be in close contact therewith, the braking face being formed therein with a convex portion.

[0016] In accordance with another embodiment of the Present Application, the card connector has such a configuration that the braking face contains a top surface of the convex portion having a height thereof which changes in an order of low, high, and low in a direction from a front side in the insertion direction of the card toward an innermost side thereof.

[0017] In accordance with a further embodiment of the Present Application, the card connector has such a configuration that the braking force to apply a brake to the slide member, which generates when the sliding portion comes into close contact with the braking face changes in the order of low, high, and low when the slide member moves in the direction opposite to the insertion direction of the card from the over-stroke position.

[0018] In accordance with a still further embodiment of the Present Application, the card connector has such a configuration that the brake member exerts an elastic force and the sliding portion is pressed against the braking face by the elastic force.

[0019] In accordance with a still further embodiment of the Present Application, the card connector has such a configuration that the sliding portion comes into tight contact with a portion of the braking face being located closer to the front side in the insertion direction of the card than the convex portion when the card is positioned at the over-stroke position, and comes into tight contact with the top surface of the convex portion when the card is at the lock position.

[0020] In accordance with a still further embodiment of the Present Application, the card connector has such a configuration that when the card is ejected, the slide member comes into tight contact with a stopper portion of the housing and stops, and the sliding portion comes into tight contact with a portion of the braking face being located closer to the innermost side in the

insertion direction of the card than the convex portion or comes to be positioned closer to the innermost side in the insertion direction of the card than the brake-receipt portion so as to be in no contact with the braking face.

[0021] In accordance with a still further embodiment of the Present Application, the card

connector has such a configuration that the urging member comprises a coil spring capable of exerting an urging force upon being compressed.

[0022] In accordance with the Present Application, the card connector has such a configuration that the convex portion is formed on the upper surface of the slide member configured to slide while holding a card, and the cantilever-like leaf spring member formed in the shell is brought into tight contact with the convex portion. Owing to the described configuration, an appropriate magnitude of braking force can be constantly stably exerted at an appropriate timing regardless of the dimensional accuracy of the card. Moreover, the card can be stably and certainly ejected at an appropriate speed while preventing the card from spring out of the card connector.

Accordingly, it is possible to provide a card connector which can be easily produced in a simple structure at a low cost with high reliability thereof without increasing the number of components.

BRIEF DESCRIPTION OF THE FIGURES

[0023] The organization and manner of the structure and operation of the Present Application, together with further objects and advantages thereof, may best be understood by reference to the following Detailed Description, taken in connection with the accompanying Figures, wherein like reference numerals identify like elements, and in which:

[0024] Figure 1 is an exploded view of a card connector according to the Present Application;

[0025] Figure 2 is a perspective view of the card connector of Fig. 1;

[0026] Figure 3 is a perspective view of the card connector of Fig. 1, illustrating a state where a shell of the card connector is removed;

[0027] Figures 4A and 4B are views illustrating a memory card according to the Present Application, in which Fig. 4A is a bottom plan view and Fig. 4B is a top plan view;

[0028] Figure 5 is a side view of the card connector of Fig. 1, illustrating the state where a side plate portion of the shell is removed when a slide member of the card connector reaches an over-stroke position thereof;

[0029] Figure 6 is a side view of the card connector of Fig. 1, illustrating the state where the side plate portion of the shell is removed when the slide member reaches a lock position;

[0030] Figure 7 is a side view of the card connector of Fig. 1, illustrating the state where the side plate portion of the shell is removed when the slide member reaches a temporary card-holding position; and

[0031] Figure 8 is an exploded perspective view of a card connector according to the prior art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] While the Present Application may be susceptible to embodiment in different forms, there is shown in the Figures, and will be described herein in detail, specific embodiments, with the understanding that the disclosure is to be considered an exemplification of the principles of the Present Application, and is not intended to limit the Present Application to that as illustrated.

[0033] In the illustrated embodiments, directional representations – *i.e.*, up, down, left, right, front, rear and the like, used for explaining the structure and movement of the various elements of the Present Application, are relative. These representations are appropriate when the elements are in the position shown in the Figures. If the description of the position of the elements changes, however, it is assumed that these representations are to be changed accordingly.

[0034] In the drawing figures, a card connector according to an embodiment of the present invention, generally designated by reference numeral 1, is attached to an electronic device or apparatus (not illustrated). A card 101 (described later) is inserted in the card connector 1, and the card 101 is mounted on the electronic device or apparatus through intervention of the card connector 1. Examples of the electronic device or apparatus include a personal computer, a cellular phone, a PDA, a digital camera, a video camera, a music player, a game machine, a car navigation device, and the like; however, the type of devices and apparatuses may be any type without being particularly limited to the above-mentioned devices and apparatuses.

[0035] Further, the card 101 is an IC card such as a SIM card, a MMC (registered trademark), a SD (registered trademark) card, a mini SD (registered trademark) card, an xD picture card (registered trademark), a Memory Stick (registered trademark), a Memory Stick Duo (registered trademark), Smart Media (registered trademark), a T-Flash (Trans-Flash) memory card, or a micro SD (registered trademark) card. Although the type of cards is not particularly limited to

the above-mentioned ones, in the present embodiment, the card 101 will be described as being a micro SD (registered trademark) card.

[0036] In addition, in this embodiment, representations of directions such as up, down, left, right, front, rear, and the like, used for explaining the structure and movement of the card

connector 1 and each part of other components are not absolute, but relative. These representations are appropriate when the card connector 1 and each part of other components are in the position shown in the drawing figures. If the position of the card connector 1 or each part of other components changes, however, it is assumed that these representations are to be changed according to the change of the position of the card connector 1, or each part of other components.

[0037] Here, the card connector 1 is provided with a housing 11 that is integrally formed of an insulating material such as synthetic resin and a shell 61 as a cover member that is integrally formed by punching and bending a plate member formed of a conductive material such as metallic member so as to be mounted on the top of the housing 11. The shell 61 is configured to cover at least a portion of an upper portion of the housing 11 and the card 101 that is accommodated in the housing 11. Moreover, the card connector 1 has a generally flat rectangular parallelepiped shape, which is attached to the electronic device or apparatus, and in which the card 101 is inserted from a front side thereof (the left upper side in the drawing figures).

[0038] Referring to Fig. 3, a perspective view of the housing 11 illustrating a state where the shell 61 is removed is illustrated for the sake of explanation purpose.

[0039] As illustrated in the drawing figures, the housing 11 is provided with a bottom wall portion 11b having such a shape that a front end portion thereof (the left upper side in Fig. 3) serving as a front side in relation to an insertion direction of the card 101 is excised into an approximately U or inverted-C shape and an innermost wall portion 11a that stands upward from the bottom wall portion 11b so as to extend along an edge at the innermost side (the right lower side in Fig. 3) of an innermost portion of the bottom wall portion 11b. Here, the bottom wall portion 11b is provided, in an upper surface thereof, with a terminal holding portion 11e to which a plurality of terminals 51 as an assembly of connection terminals is attached. On the upper surface of the terminal holding portion 11e, a plurality of terminal fitting grooves is formed so as to extend in a front-rear direction (a direction for connecting the left upper side and the right

lower side in Fig. 3), and the terminals 51 as the connection terminals are inserted and fitted into the respective terminal fitting grooves.

[0040] The terminals 51 have base portions thereof 51a being fitted into corresponding ones of the terminal fitting grooves and have extreme end portions thereof 51b extending obliquely upward toward the innermost wall portion 11a so as to be projected further outward from the upper surface of the bottom wall portion 11b. The extreme end portions 51b of the terminals 51 function as a contact portion, respectively, and are brought into electrical contact with a plurality of contact pads 151 formed as terminal members that are arranged on a lower surface of the card 101. Moreover, solder tail portions 51c that extend from the base portions of the terminals 51 are projected toward the front side from the front edge of the bottom wall portion 11b and electrically connected to signal lines, contact pads, and terminals, and the like, formed on a wiring board of the electronic device or apparatus, that is, to counterpart terminal members, by means of soldering.

[0041] Moreover, in a portion of the bottom wall portion 11b corresponding to a lower side of the extreme end portions 51b of the terminals 51, an opening portion 11i is formed, which penetrates through the bottom wall portion 11b in a thickness direction. It should be noted that the opening portion 11i may be canceled as required.

[0042] Further, the housing 11 includes a first side wall portion 11c as a side wall having an L-shaped cross section and extending in the front-rear direction along one lateral edge of the bottom wall portion 11b and a second side wall portion 11d as a side wall extending in the front-rear direction along the other lateral edge of the bottom wall portion 11b.

[0043] A card guide mechanism accommodation portion 11h is formed on an inner side of the second side wall portion 11d, and a slide member 21 of a card guide mechanism for guiding the card 101 inserted into the card connector 1 is fitted to the card guide mechanism accommodation portion 11h so as to be slidable in the front-rear direction. Here, the slide member 21 is configured by a card holding portion 21a for holding the card 101, a slide cam portion 21b as a movable cam member, and a brake-receipt portion 21g configured to receive a braking force for controlling the sliding speed. The card holding portion 21a, the slide cam portion 21b, and the brake-receipt portion 21g are formed by integral molding with an insulating material such as synthetic resin.

[0044] Furthermore, the card holding portion 21a is provided with a first engagement portion 21c and a second engagement portion 21d that are projected from side surfaces at an inner side thereof. The first engagement portion 21c and the second engagement portion 21d engage with an engagement portion containing an unevenness that is formed on the side surface of the card 101. Moreover, the slide member 21 moves in the front-rear direction together with the card 101 in a state where the card 101 is held by the first engagement portion 21c and the second engagement portion 21d of the card holding portion 21a.

[0045] In addition, a side surface at the innermost side of the card holding portion 21a functions as an urging force receiving portion 21e that receives an urging force of an urging member 81 configured as a coil spring capable of exerting an urging force in a compressed state. A locking projection 21f that locks the urging member 81 is formed in the urging force receiving portion 21e, and one end of the urging member 81 is attached to the locking projection 21f. Further, the other end of the urging member 81 is attached to the innermost wall portion 11a. Moreover, the innermost wall portion 11a is formed with a locking projection configured to be capable of locking the urging member 81. Owing to such a configuration, the slide member 21 is urged in a direction opposite to the insertion direction of the card 101, that is, in an ejection direction of the card 101, by the urging member 81.

[0046] The card connector 1 is a so-called push-in/push-out type connector, or commonly known as, a push-push type connector that requires an operation of pushing the card 101 both when the card 101 is inserted into the card connector 1 and when the card 101 is ejected out of the card connector 1. Such an operation is the same as an alternate action (a position retention type or a push-on/push-off type) in the field of a push button switch. The slide cam portion 21b functions as a slide cam in a cam mechanism of a heart-shaped cam for realizing the push-push type action.

[0047] For this reason, a cam groove 23 is formed in an upper surface of the slide cam portion 21b, and a free end of an elongated pin member 71 as a fixed cam member is engaged with the cam groove 23. Further, the other end of the pin member 71 is a fixed end and is latched to an upper surface of a latching portion 11f formed in a portion of the card guide mechanism accommodation portion 11h of the housing 11 that is located in the vicinity of the innermost wall portion 11a so as to be pivotably coupled thereto. Moreover, by the cooperation of the pin member 71 and the cam groove 23, the slide member 21 that moves together with the card 101 can perform the push-push operation. Owing to such a configuration, when the card 101 is

moved in the insertion direction so as to reach a termination point by a push operation for pushing the card 101 in the insertion direction, the card guide mechanism moves the card 101 in a direction opposite to the insertion direction from the termination point by an urging force of the urging member 81 so that the card 101 is ejected. In this case, the slide member 21 moving in the direction opposite to the insertion direction comes into tight contact with a stopper portion 11g formed in the vicinity of the front end of the second side wall portion 11d and stops there.

[0048] The pin member 71 is held by being urged downward from an upper side by a pin pressing member 65 of the shell 61. The pin pressing member 65 is a plate-like member having restoring properties and formed by bending a portion of the shell 61 so as to be able to apply a pressing force toward the bottom wall portion 11b of the housing 11. The pin member 71 is disposed between the pin pressing member 65 and the slide member 21 or the housing 11 so as to be held in a state where it is not separated from the slide member 21 or the housing 11.

[0049] Further, the shell 61 has a generally rectangular top plate portion 62 and a plurality of side plate portions 64 that is erected from a plurality of locations of the lateral edges of the top plate portion 62. Each of the side plate portions 64 is provided with a plurality of latching openings 63. As will be understood from Fig. 2, when the shell 61 is attached to an upper side of the housing 11, the latching openings 63 are latched to latching projections 13 that are formed on outer surfaces of the innermost wall portion 11a, the first side wall portion 11c, and the second side wall portion 11d of the housing 11, and thus, the shell 61 is fixed to the housing 11.

[0050] Moreover, the shell 61 includes a brake member 66 formed in the top plate portion 62, as well as the pin pressing member 65. The brake member 66 is a cantilever-like leaf spring member formed by cutting and raising a portion of the top plate portion 62. The brake member 66 has a base end portion thereof being integrally connected to the top plate portion 62 and a free end portion thereof being formed with a convex sliding portion 66a configured to downwardly protrude therefrom. Moreover, the brake member 66 is formed in a portion of the top plate portion 62 being located in the vicinity of the side plate portion 64 corresponding to the second side wall portion 11d, and is configured to generally extend in the front-rear direction along the side plate portions 64. The sliding portion 66a is configured to extend obliquely downward from a base end thereof toward the innermost side, that is, in the direction for approaching the bottom wall portion 11b.

[0051] The brake-receipt portion 21g of the slide member 21 is an elongated rectangular plate-like member arranged on a lateral side of the slide cam portion 21b so as to extend along the movement direction of the slide member 21, namely, in the direction from the front to the rear and vice versa. The lower surface of the brake-receipt portion 21g slides on a sliding face 11j which is an upper surface of the second side wall portion 11d of the housing 11. More specifically, the brake-receipt portion 21g is always upwardly supported by the sliding face 11j from below.

[0052] A top surface of the brake-receipt portion 21g, which is an upper surface thereof, is configured to function as a braking face capable of permitting the sliding portion 66a of the brake member 66 to be in close contact therewith and receiving a braking force when the sliding portion 66a makes slide contact therewith during sliding of the slide member 21. Moreover, a convex portion 21h is formed as a raised portion provided on a top surface of the brake-receipt portion 21g. The convex portion 21h is rectangular in side view thereof, and a top surface thereof is parallel with the top surface of the brake-receipt portion 21g and is similarly capable of functioning as a braking face. The convex portion 21h is formed in an intermediate range in the longitudinal direction, i.e., the front-rear direction, of the top surface of the brake-receipt portion 21g. Therefore, a height of the braking face of the brake-receipt portion 21g changes in the order of low, high, and low, in the direction from the front side toward the innermost side. The top surface of the convex portion 21h is not necessarily flat but may be formed with a concave portion; however, in this specification, the case of the flat top surface will be described, for the sake of explanation.

[0053] The brake member 66 is formed at a position where the sliding portion 66a confronts the top surface of the brake-receipt portion 21g in a state where the shell 61 is fixed to the housing 11. When the sliding portion 66a is pressed against the top surface of the brake-receipt portion 21g by the restoring force of the brake member 66, a braking force for applying a brake to the slide member 21 moving in the front-rear direction is generated. Since the brake member 66 is a member formed by applying processing, e.g., punching and bending, to the top plate portion 62 of the shell 61 formed of a metal plate, it can be easily produced with high accuracy. Moreover, since the brake member 66 is made of metal, it is able to exhibit extremely stable restoring properties. Therefore, the brake member 66 is able to stably generate a braking force of a desired magnitude in a state where the sliding portion 66a is in close contact with the top surface

of the brake-receipt portion 21g. Among other things, it should be noted that the sliding portion 66a is not always necessary to make close contact with the top surface of the brake-receipt portion 21g to generate the braking force, but depending on the position of the slide member 21 moving in the front-rear direction, may be in a state of being in no contact with the top surface of the brake-receipt portion 21g and generating no braking force.

[0054] The housing 11 is formed, in the innermost portion thereof, with a card detection switch capable of detecting that the contact pads 151 of the card 101 are in contact with the terminals 51 and thus detecting that the card 101 is fitted into the card connector 1. The card detection switch is comprised of a first contact member 52 and a second contact member 53 which are attached to the innermost wall portion 11a and to a position in the vicinity thereof. Although the switch may be any type of switch such as a switch capable of detecting a connection state between the contact pads 151 of the card 101 and the terminals 51, the case of the card detection switch will be described, for the convenience sake of explanation.

[0055] The first contact member 52 includes an attachment portion 52a that is attached to the innermost wall portion 11a, a cantilever-like body portion 52b that is connected to the attachment portion 52a at a base end thereof and extends laterally, i.e., toward the first side wall portion 11c, and an abutting portion 52c that is connected to a free end of the body portion 52b. Specifically, the attachment portion 52a is substantially parallel to the side surface of the innermost wall portion 11a. The body portion 52b is angled with respect to the side surface of the innermost wall portion 11a in a state where the card 101 is not yet fitted by insertion into the card connector 1. The abutting portion 52c is arranged to protrude toward the front side with respect to the insertion direction of the card 101. Therefore, when the card 101 is inserted, the front end of the card 101 comes into close contact with the abutting portion 52c.

[0056] On the other hand, the second contact member 53 includes an attachment portion 53a that is attached to a portion of the bottom wall portion 11b which is located in the vicinity of the innermost wall portion 11a, a cantilever-like body portion 53b that is connected to the attachment portion 53a at a base end thereof and extends toward the first side wall portion 11c, and an abutting portion 53c that is connected to a free end of the body portion 53b. Further, the second contact member 53 is disposed on a lower side than the first contact member 52 and in the vicinity of the innermost wall portion 11a.

[0057] For this reason, in a state where the card 101 is not yet inserted, the first contact member 52 and the second contact member 53 are in no contact with each other, and thus, the card detection switch is in a non-conduction state, that is, in an OFF state.

[0058] When the card 101 is inserted to reach a position where the contact pads 151 and the terminals 51 are in contact with each other, the abutting portion 52c of the first contact member 52 is pressed by the front end of the card 101 to be moved toward the innermost wall portion 11a, so that the abutting portion 52c is brought into tight contact with the abutting portion 53c of the second contact member 53. With this operation, the first contact member 52 and the second contact member 53 are brought into close contact with each other, and thus, the card detection switch is put in a conduction state, namely, in an ON state.

[0059] Next, a description of the structure of the card 101 will now be provided herein below. As described above, in the present embodiment, the card 101 is a micro SD (registered trademark) card and has a generally rectangular plate-like shape as illustrated in Figs. 4A and 4B, having a dimension that a length (the vertical dimension in Figs. 4A and 4B) is 15.0 mm and a width (the horizontal dimension in Figs. 4A and 4B) is 11.0 mm. A plurality of contact pads 151 is arranged at a position in the vicinity of the front end of a principal surface thereof so as to extend along one edge thereof.

[0060] Next, a description of the operation of the card connector 1 having the above-described structure will be provided below. First, the operation when the card 101 is inserted will be described.

[0061] In this case, a user inserts the card 101 from the front side of the card connector 1 by the user's fingers or the like. The card 101 is inserted in an attitude wherein the front end thereof is directed toward the innermost wall portion 11a of the housing 11, the lower surface thereof having the contact pads 151 arranged thereon opposes the bottom wall portion 11b, and the upper surface thereof without the contact pads 151 arranged thereon opposes the top plate portion 62 of the shell 61. With this operation, the card 101 is inserted into the housing 11 with the one side surface thereof being guided along the first side wall portion 11c of the housing 11 while the other side surface thereof as the engagement portion having formed thereon a convex portion, a concave portion, and a flat surface portion, being guided along the second side wall portion 11d of the housing 11.

[0062] Subsequently, when the user pushes the card 101 further toward the deeper side of the housing 11, the first engagement portion 21c and the second engagement portion 21d of the slide member 21 are respectively engaged with the engagement portions on the side surfaces of the card 101, so that the card 101 is moved toward the innermost wall portion 11a together with the slide member 21 while being securely held by the slide member 21. At this time, the pressing force exerted by the user's fingers or the like is transmitted from the engagement portions of the card 101 via the first engagement portion 21c or the second engagement portion 21d to the slide member 21. Then, since the slide member 21 pressurizes the urging member 81 comprised of a coil spring, the slide member 21 and the card 101 receive a repulsive force of the urging member 81. However, since the repulsive force is weaker than the pressing force of the user's fingers or the like, the slide member 21 and the card 101 are forced to move while resisting against the repulsive force. In this case, the slide member 21 slides along the second side wall portion 11d, and the card 101 is moved together with the slide member 21. Then, the slide member 21 and the card 101 reach an over-stroke position where they advance further forward than the lock position, thereby entering into an over-stroke state.

[0063] Subsequently, when the user stops the operation of pushing the card 101 to release the application of the pressing force to the card 101, the slide member 21 and the card 101 are moved in a direction away from the innermost wall portion 11a by the repulsive force of the urging member 81. Then, the slide member 21 and the card 101 stop at the lock position whereat the card 101 is held at a locked state within the card connector 1. This is because the free end of the pin member 71 being engaged with the cam groove 23 formed on the upper surface of the slide cam portion 21b of the slide member 21 is latched to a portion of the cam groove 23 to stop the movement of the slide member 21, so that the slide member 21 ceases its movement at the lock position.

[0064] Moreover, since the card 101 is held at the lock position, the card 101 enters into a state where data can be transmitted and received between the card 101 and calculation means or the like of the electronic device or apparatus equipped with a board having the card connector 1 mounted thereon. Furthermore, when the card 101 is held at the lock position, the contact pads 151 of the card 101 are brought into contact with and electrically connected to the extreme end portions 51b of the terminals 51. In addition, the abutting portion 52c of the first contact member 52 of the card detection switch is pressed by the front end of the card 101 to be

displaced toward the innermost side, so that the abutting portion 52c is brought into close contact with the abutting portion 53c of the second contact member 53. With this operation, the first contact member 52 and the second contact member 53 are brought into contact with each other, and thus, the card detection switch is in an ON state.

5 [0065] Next, a description of the operation of ejecting the card 101 from the card connector 1 will now be provided herein below. In this case, when the user pushes the card 101 by the user's fingers or the like, the slide member 21 and the card 101 are moved toward the innermost wall portion 11a from the lock position. Moreover, when the user pushes the card 101 further toward the deeper side of the housing 11, the slide member 21 and the card 101 reach the over-stroke
10 position where they further advance forward than the lock position, thereby entering into an over-stroke state, as best shown in Fig. 5.

[0066] When the slide member 21 is at the over-stroke position, the sliding portion 66a of the brake member 66 is in close contact with the top surface of the brake-receipt portion 21g. That is to say, the sliding portion 66a comes into close contact with the low portion of the braking
15 face. Therefore, the slide member 21 receives a weak braking force when it is positioned in the range of the over-stroke position and the vicinity thereof. Nevertheless, when the slide member 21 is at the over-stroke position but the sliding portion 66a is not yet in close contact with the top surface of the brake-receipt portion 21g, the slide member 21 does not receive any braking force as long as it is positioned in the range of the over-stroke position and the vicinity thereof.

20 [0067] Subsequently, when the user stops the operation for pushing the card 101 to release the application of the pressing force to the card 101, the slide member 21 and the card 101 being positioned at the over-stroke position are moved in a direction away from the innermost wall portion 11a, namely, in a direction opposite to the insertion direction, by the urging force of the urging member 81. In this case, as described above, since the slide member 21 receives only a
25 weak braking force from the brake member 66 or any braking force is not generated, the urging force of the urging member 81 might not be substantially diminished by the braking force of the brake member 66.

[0068] At a time point when the slide member 21 and the card 101 start moving in the direction opposite to the insertion direction from the over-stroke position, namely, at a time point when the
30 operation of ejecting the card 101 is started, static friction is stronger than dynamic friction during periods where they start moving from a stationary state. Therefore, a force stronger than

the static friction needs to be applied to the slide member 21 and the card 101 as the ejecting force.

[0069] For this reason, if the braking force of the brake member 66 is too strong at the time point when the operation for ejecting the card 101 is started, the urging force of the urging member 81 is greatly diminished, and thus, a sufficiently large ejecting force cannot be applied to the slide member 21 and the card 101. As a result, the operation for ejecting the card 101 cannot be started. That is to say, the ejection properties of the card 101 are deteriorated, and in the worst case, the card 101 may not be ejected.

[0070] However, in the present embodiment, as described above, at the time point when the operation for ejecting the card 101 is started, since the slide member 21 receives only a weak braking force from the brake member 66, the urging force of the urging member 81 is not greatly diminished, and thus, a sufficiently large ejecting force can be applied to the slide member 21 and the card 101. Owing to such a configuration, even when the top surface of the card 101 makes frictional contact with the inner surface of the housing 11 and/or the shell 61 and thus a strong frictional force is applied to the card 101, since the ejecting force applied to the slide member 21 and the card 101 is stronger than the frictional force, the card 101 can be moved in the direction opposite to the insertion direction to be securely ejected. That is to say, the ejection properties of the card 101 are not deteriorated.

[0071] When the operation for ejecting the card 101 is started, the slide member 21 and the card 101 are moved toward the front side by the urging force of the urging member 81 to pass through the lock position as illustrated in Fig. 6 to be moved further in the direction opposite to the insertion direction of the card 101.

[0072] When the slide member 21 is positioned at the lock position or the vicinity thereof, the sliding portion 66a of the brake member 66 is in close contact with the top surface of the convex portion 21h. That is to say, the sliding portion 66a comes into close contact with the high portion of the braking face. Therefore, the slide member 21 receives a strong braking force when it is positioned in a predetermined range of the lock position and the vicinity thereof, namely, a range where the convex portion 21h is present. Moreover, since the urging force of the urging member 81 is greatly diminished by the braking force of the brake member 66, the moving speed of the slide member 21 and the card 101 is effectively decelerated. Owing to such a configuration, it is possible to prevent the card 101 from springing out of the card connector 1.

[0073] As described above, the convex portion 21h is formed in the intermediate range in the front-rear direction of the top surface of the brake-receipt portion 21g, and the height of the braking face of the brake-receipt portion 21g changes in the order of low, high, and low, in a direction from the front side toward the innermost side. Moreover, the position of the convex portion 21h is slightly separated from the sliding portion 66a of the brake member 66 at the time instant when the slide member 21 is positioned at the over-stroke position, as illustrated in Fig. 5. Therefore, during a short period after the operation for ejecting the card 101 is started, the sliding portion 66a comes into close contact with the top surface of the brake-receipt portion 21g but does make no contact with the top surface of the convex portion 21h. That is to say, the sliding portion 66a comes into contact with the low portion of the braking face but does make no contact with the high portion. Therefore, the slide member 21 does not receive any strong braking force until a moving speed thereof is accelerated to some degree by the urging force of the urging member 81. As illustrated in Fig. 6, at the time instant when the sliding portion 66a comes into close contact with the top surface of the convex portion 21h, since the slide member 21 and the card 101 are already moved, the frictional force that they receive changes to the dynamic friction that is weaker than the static friction. Further, since the inertial force is generated, they might not stop even when a strong braking force is applied thereto. That is to say, the ejection properties of the card 101 are not deteriorated.

[0074] However, when the portion of the braking face coming into contact with the sliding portion 66a changes from the top surface of the brake-receipt portion 21g to the top surface of the convex portion 21h, namely, when the sliding portion 66a comes into close contact with the front end (the left end in Figs. 5 and 6) of the convex portion 21h, the braking force increases in a stepwise manner, and therefore, the slide member 21 is expected to receive an extremely strong braking force. However, as described above, at this time instant, in addition to the fact that the friction changes to the smaller dynamic friction and the inertial force is generated, since the urging member 81 comprised of the coil spring is in a greatly compressed state, a large urging force is generated. For this reason, even when the slide member 21 receives an extremely strong braking force from the sliding portion 66a, the slide member 21 and the card 101 won't cease their movement. In addition, the braking force when the sliding portion 66a comes into close contact with the front end of the convex portion 21h may be decreased by appropriately modifying the shape of the sliding portion 66a and/or the front end of the convex portion 21h; for

example, the front end of the convex portion 21h may be configured to have a curved or sloped surface, and the slope of the outer shape of the sliding portion 66a may be made gentle or the curvature of the outer shape may be increased.

[0075] After the slide member 21 and the card 101 are further moved toward the front side by the urging force of the urging member 81, the slide member 21 comes into close contact with the stopper portion 11g formed on the second side wall portion 11d, thereby stopping at a temporary card-holding position as illustrated in Fig. 7. At the temporary card-holding position, since the attitude of the slide member 21 changes, the engagement between the first engagement portion 21c and the second engagement portion 21d of the slide member 21 and the engagement portion of the card 101 becomes moderate. Therefore, although the card 101 is at least held by the slide member 21, when the user pulls out the card 101 with the user's fingers or the like, the state of being held by the slide member 21 is released even without application of a stronger pulling force and thus, the card 101 is taken out of the card connector 1. Moreover, the abutting portion 52c of the first contact member 52 of the card detection switch moves back to its original position by the restoring properties of the body portion 52b. For this reason, the first contact member 52 and the second contact member 53 are in no contact with each other, and thus, the card detection switch is in an OFF state.

[0076] When the slide member 21 is positioned at the temporary card-holding position, the sliding portion 66a of the brake member 66 is not in close contact with the top surface of the brake-receipt portion 21g. That is to say, the innermost end (the right end in Fig. 7) of the brake-receipt portion 21g is positioned closer to the front side (the left side in Fig. 7) than the sliding portion 66a. In addition, the length of the brake-receipt portion 21g may be extended so that even when the slide member 21 is positioned at the temporary card-holding position, the innermost end of the brake-receipt portion 21g is positioned closer to the innermost side than the sliding portion 66a, and the sliding portion 66a comes into close contact with the top surface of the brake-receipt portion 21g. That is to say, when the slide member 21 is positioned at the temporary card-holding position, the sliding portion 66a is brought into no contact with the braking face or is put into close contact with the low portion of the braking face.

[0077] For this reason, the slide member 21 does not receive any braking force, or if receives, a weakened braking force when it is positioned in the range of the temporary card-holding position

and the vicinity thereof. Therefore, the urging force of the urging member 81 is never or hardly diminished by the braking force of the brake member 66.

[0078] When the slide member 21 is positioned in the range of the temporary card-holding position and the vicinity thereof, the urging member 81 comprised of the coil spring is hardly compressed and has a length close to a free length thereof, and thus, substantially no urging force is generated.

[0079] Therefore, if the braking force of the brake member 66 is large, there is a possibility that the slide member 21 and the card 101 stop. That is to say, the ejection properties of the card 101 are deteriorated, and in the worst case, there is a possibility that the card 101 is not ejected.

[0080] For instance, in the conventional card connector described in “Description of the Related Art” section, the braking force exerted by the brake shoe 819 becomes the maximum when the memory card 901 is ejected from the housing 811, that is, when the slide member 821 reaches the frontmost position and the abutting portion 821e comes into tight contact with the stopper portion 811g. In such a case, since the coil spring 881 has a length close to a free length thereof and thus the repulsive force thereof becomes the minimum, the braking force exerted by the brake shoe 819 becomes stronger than the repulsive force of the coil spring 881, so that it is highly likely that the memory card 901 is not ejected from the housing 811.

[0081] To the contrary, in the present embodiment, since the slide member 21 does not receive a braking force, or if receives, only a weakened braking force when it is positioned in the range of the temporary card-holding position and the vicinity thereof, the urging force of the urging member 81 is never or hardly diminished. Owing to such a configuration, even when the urging force applied from the urging member 81 is small, the slide member 21 and the card 101 are able to reach the temporary card-holding position without stopping midway. That is to say, the ejection properties of the card 101 are not deteriorated.

[0082] Furthermore, as described above, at a time instant immediately before the slide member 21 reaches the range of the temporary card-holding position and the vicinity thereof, i.e., is positioned at the lock position or the vicinity thereof, the sliding portion 66a of the brake member 66 is in close contact with the upper surface of the convex portion 21h, i.e., with the high portion of the braking face. Therefore, the moving speed of the slide member 21 and the card 101 is effectively decelerated. For this reason, when the slide member 21 is positioned in the range of the temporary card-holding position and the vicinity thereof, the card 101 is

prevented from springing out from the card connector 1 even when no braking force or only a weakened braking force is applied thereto.

[0083] Moreover, even when the slide member 21 comes into close contact with the stopper portion 11g and stops, since the moving speed thereof is effectively decelerated, no large impact is generated.

[0084] Furthermore, the present embodiment has been described with respect to a case where the brake member 66 is formed on the top plate portion 62 of the shell 61, the upper surface of the brake-receipt portion 21g is configured to function as the braking face, and the convex portion 21h is formed on the upper surface of the brake-receipt portion 21g. However, the brake member 66 may be formed on the side plate portions 64 of the shell 61, the side surface of the brake-receipt portion 21g may be configured to function as the braking face, and the convex portion 21h may be formed on the side surface of the brake-receipt portion 21g.

[0085] In addition, in the present embodiment, a description on the change in the braking force that is applied from the brake member 66 to the brake-receipt portion 21g when the card 101 is inserted into the card connector 1 is omitted. This is because the force of inserting the card 101 by the user's fingers or the like is sufficiently larger than the braking force or the urging force of the urging member 81; the card 101 can be inserted into the card connector 1 without being substantially affected by the braking force. Therefore, even when the braking force is applied from the brake member 66 to the brake-receipt portion 21g, the operability for inserting the card 101 into the card connector 1 is not deteriorated.

[0086] As described above, in the card connector 1 according to the present embodiment, the shell 61 is provided with the cantilever-like brake member 66 which has the base end portion thereof being integrally connected to the shell 61 and the free end thereof being formed with the sliding portion 66a. The slide member 21 is provided with the brake-receipt portion 21g containing the braking face capable of permitting the sliding portion 66a to make close contact therewith, and the braking face is formed therein with the convex portion 21h raised therefrom. Owing to such a configuration, an appropriate magnitude of braking force can be stably exerted at an appropriate timing regardless of the outline finishing accuracy of the card 101. Therefore, the card 101 can be constantly and certainly ejected at an appropriate speed. Moreover, it is possible to prevent the card 101 from springing out of the card connector 1. Furthermore, the card connector 101 can be produced in a simple structure without increasing the number of

components. Therefore, the card connector 101 can be easily produced at a low cost with high reliability thereof.

[0087] Moreover, the sliding portion 66a comes into close contact with a portion of the braking face being located closer to the front side in the insertion direction of the card 101 than the convex portion 21h when the card 101 is positioned at the over-stroke position, and comes into close contact with the top surface of the convex portion 21h when the card 101 is positioned at the lock position. Owing to such a configuration, at the time instant when the operation for ejecting the card 101 is started, since the slide member 21 receives only a somewhat weakened braking force, the ejection properties of the card 101 are not deteriorated. Moreover, when the slide member 21 is positioned at the lock position, since the urging force of the urging member 81 is greatly diminished by the braking force, the moving speed of the slide member 21 and the card 101 is effectively decelerated and thus, the card 101 is prevented from springing out of the card connector 1.

[0088] Furthermore, when the card 101 is ejected, the slide member 21 comes into close contact with the stopper portion 11g of the housing 11 and stops. When the slide member 21 comes into close contact with the stopper portion 11g and stops, the sliding portion 66a comes into close contact with a portion of the braking face being located closer to the innermost side in the insertion direction of the card 101 than the convex portion 21h or comes to be positioned closer to the innermost side in the insertion direction of the card 101 than the brake-receipt portion 21g so as not to make close contact with the braking face. Owing to such a configuration, when the slide member 21 comes into close contact with the stopper portion 11g and stops, the slide member 21 does not receive any braking force, or if receives, a weakened braking force. Therefore, the urging force of the urging member 81 is never or hardly diminished by the braking force. Accordingly, the ejection properties of the card 101 are not deteriorated.

[0089] The present invention is not limited to the above-described embodiments, and may be varied or modified in various ways based on the gist of the present invention, and these variations and modification are not eliminated from the scope of the present invention as claimed in the attached claims.

[0090] While a preferred embodiment of the Present Application is shown and described, it is envisioned that those skilled in the art may devise various modifications without departing from the spirit and scope of the foregoing Description and the appended Claims.

CLAIMS**WHAT IS CLAIMED IS:**

- 5 1. A card connector comprising:
 a housing configured to accommodate therein a card which is provided with
terminal members;
 connection terminals mounted in the housing and configured to be capable of
coming into contact with the terminal members of the card;
10 a card guide mechanism which is provided with a slide member configured to
slide while holding therein the card inserted into the housing and an urging member configured
to urge the slide member in a direction opposite to an insertion direction of the card, and is
configured to hold the card at a lock position thereof to thereby maintain a state where the
terminal members of the card are in contact with the connection terminals, and when the card is
15 moved in the insertion direction to reach an over-stroke position thereof by a pushing operation
to push the card being held at the lock position in the insertion direction, to thereby move the
card in the direction opposite to the insertion direction from the over-stroke position by an urging
force of the urging member to be ejected therefrom; and
 a cover member mounted on the housing and configured to cover at least the slide
20 member and a portion of the card inserted into the housing;
 wherein:
 the cover member is provided with a cantilever-like brake member which has
 a base end portion thereof being integrally connected to the cover member
 and a free end thereof being formed with a sliding portion; and
25 the slide member is provided with a brake-receipt portion containing a braking
face capable of permitting the sliding portion to be in close contact
therewith, the braking face being formed therein with a convex portion.
2. The card connector according to Claim 1, wherein the braking face contains a top
30 surface of the convex portion having a height thereof which changes in an order of low, high,

and low in a direction from a front side in the insertion direction of the card toward an innermost side thereof.

3. The card connector according to Claim 2, wherein the braking force to apply a
5 brake to the slide member, which generates when the sliding portion comes into tight contact with the braking face changes in the order of low, high, and low when the slide member moves in the direction opposite to the insertion direction of the card from the over-stroke position.

4. The card connector according to Claim 3, wherein the brake member exerts an
10 elastic force and the sliding portion is pressed against the braking face by the elastic force.

5. The card connector according to Claim 4, wherein the sliding portion comes into
tight contact with a portion of the braking face being located closer to the front side in the
insertion direction of the card than the convex portion when the card is positioned at the over-
15 stroke position, and comes into tight contact with the top surface of the convex portion when the card is positioned at the lock position.

6. The card connector according to Claim 5, wherein when the card is ejected, the
slide member comes into tight contact with a stopper portion of the housing and stops, and when
20 the slide member comes into tight contact with the stopper portion and stops, the sliding portion comes into tight contact with a portion of the braking face being located closer to the innermost side in the insertion direction of the card than the convex portion or comes to be positioned closer to the innermost side in the insertion direction of the card than the brake-receipt portion so as to be no contact with the braking face.

7. The card connector according to Claim 6, wherein the urging member comprises a
25 coil spring capable of exerting an urging force upon being compressed.

8. The card connector according to Claim 1, wherein the brake member exerts an
30 elastic force and the sliding portion is pressed against the braking face by the elastic force.

9. The card connector according to Claim 1, wherein the sliding portion comes into tight contact with a portion of the braking face being located closer to the front side in the insertion direction of the card than the convex portion when the card is positioned at the over-stroke position, and comes into tight contact with the top surface of the convex portion when the card is positioned at the lock position.

10. The card connector according to Claim 1, wherein when the card is ejected, the slide member comes into tight contact with a stopper portion of the housing and stops, and when the slide member comes into tight contact with the stopper portion and stops, the sliding portion comes into tight contact with a portion of the braking face being located closer to the innermost side in the insertion direction of the card than the convex portion or comes to be positioned closer to the innermost side in the insertion direction of the card than the brake-receipt portion so as to be no contact with the braking face.

11. The card connector according to Claim 1, wherein the urging member comprises a coil spring capable of exerting an urging force upon being compressed.

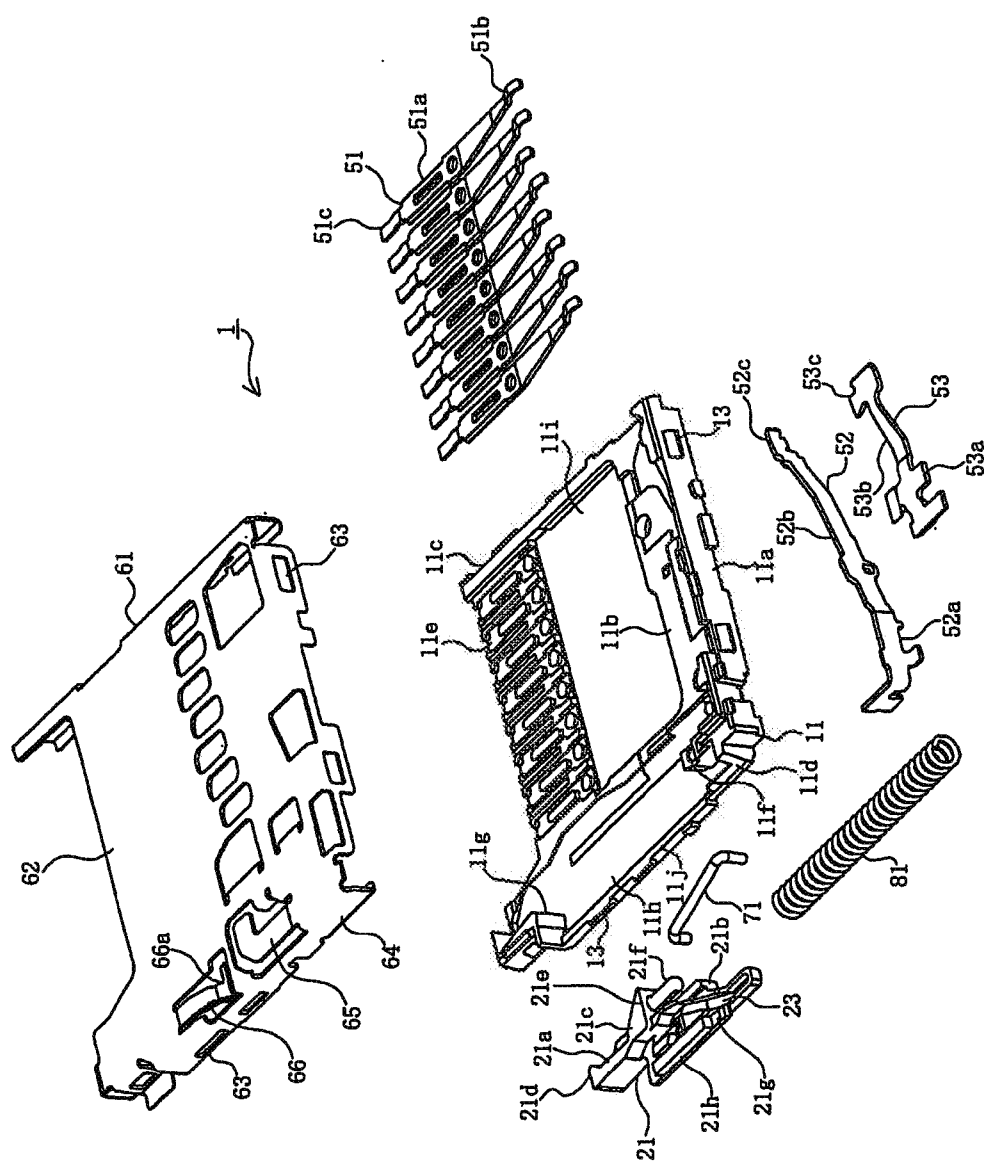


FIG. 1

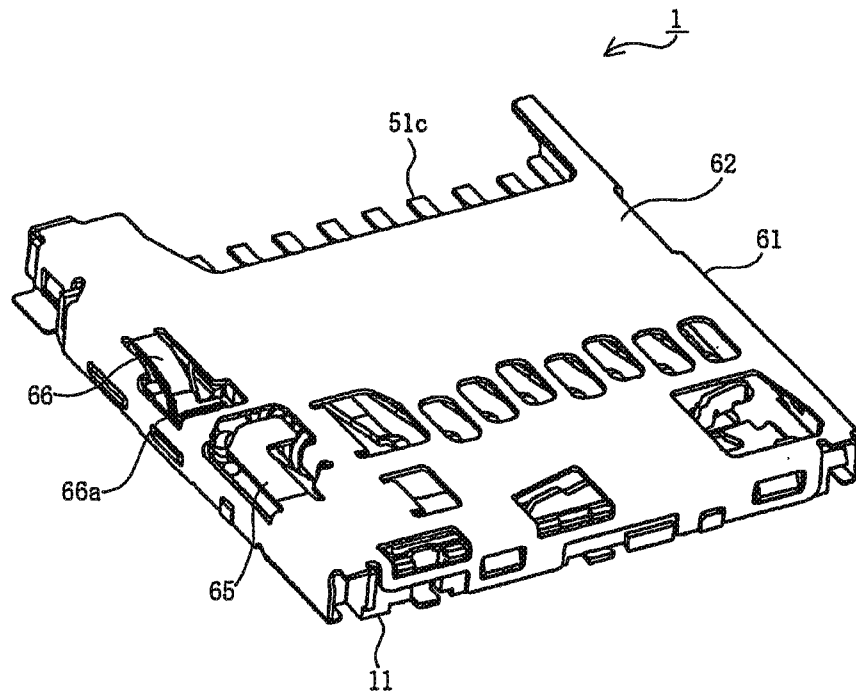


FIG. 2

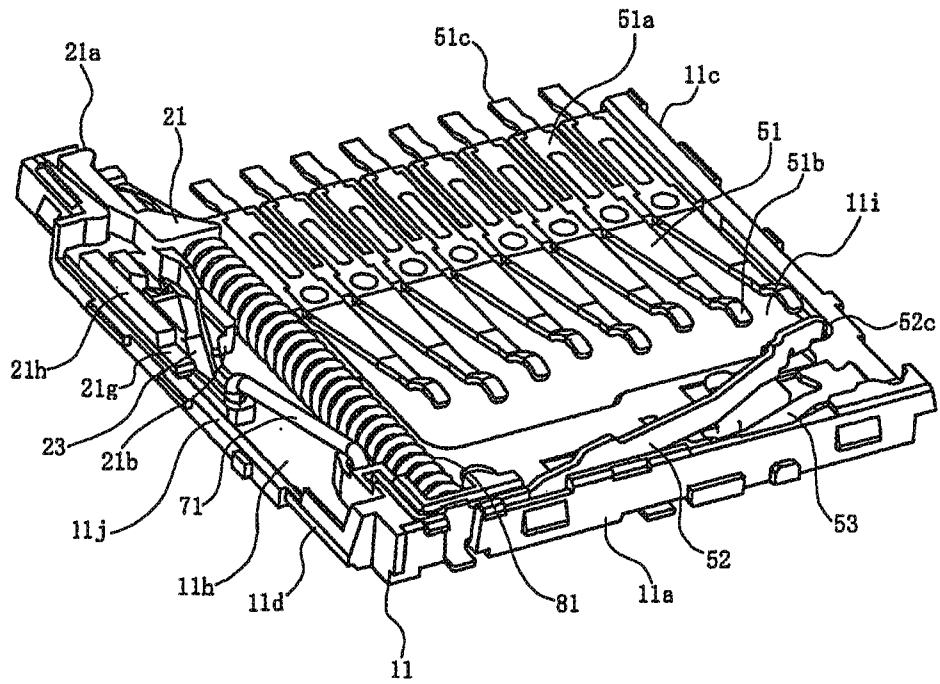


FIG. 3

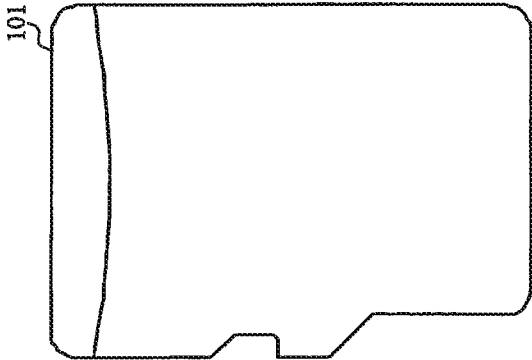


FIG. 4B

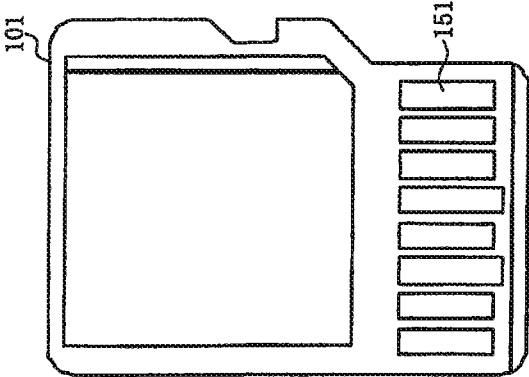


FIG. 4A

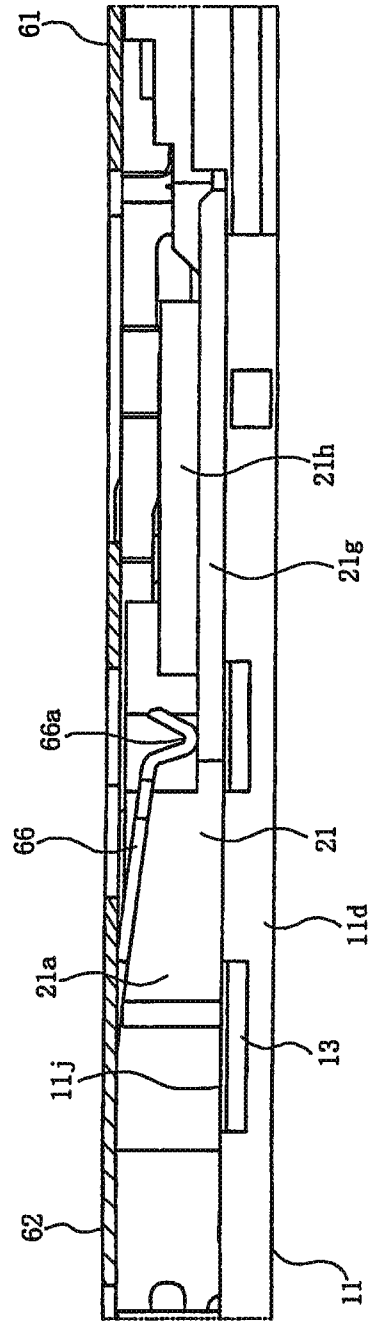


FIG. 5

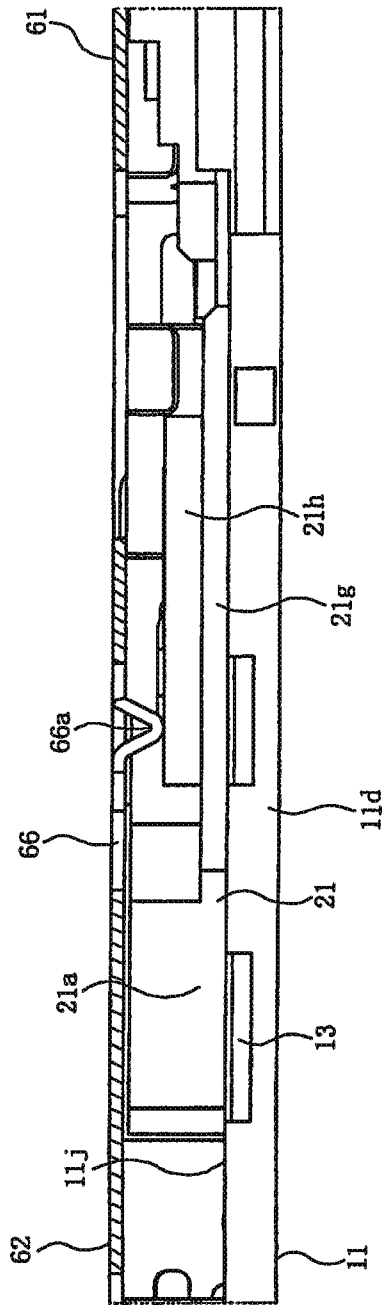


FIG. 6

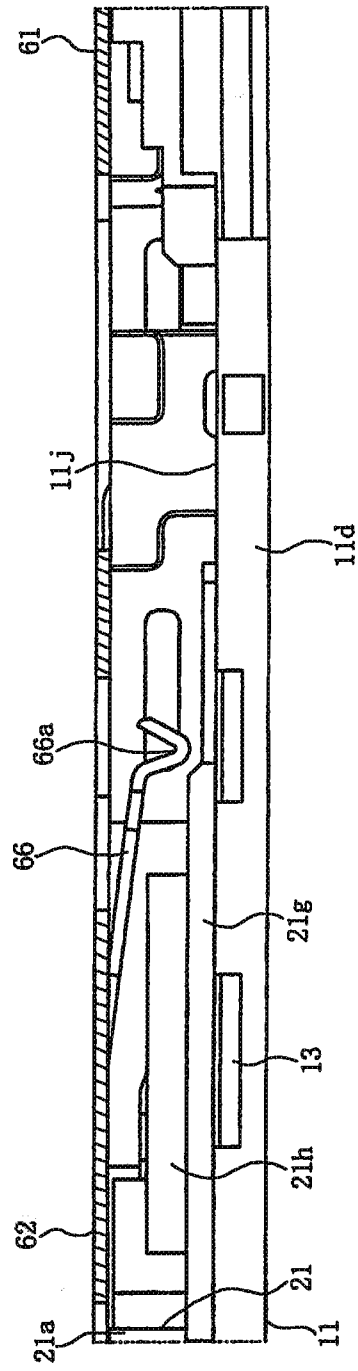
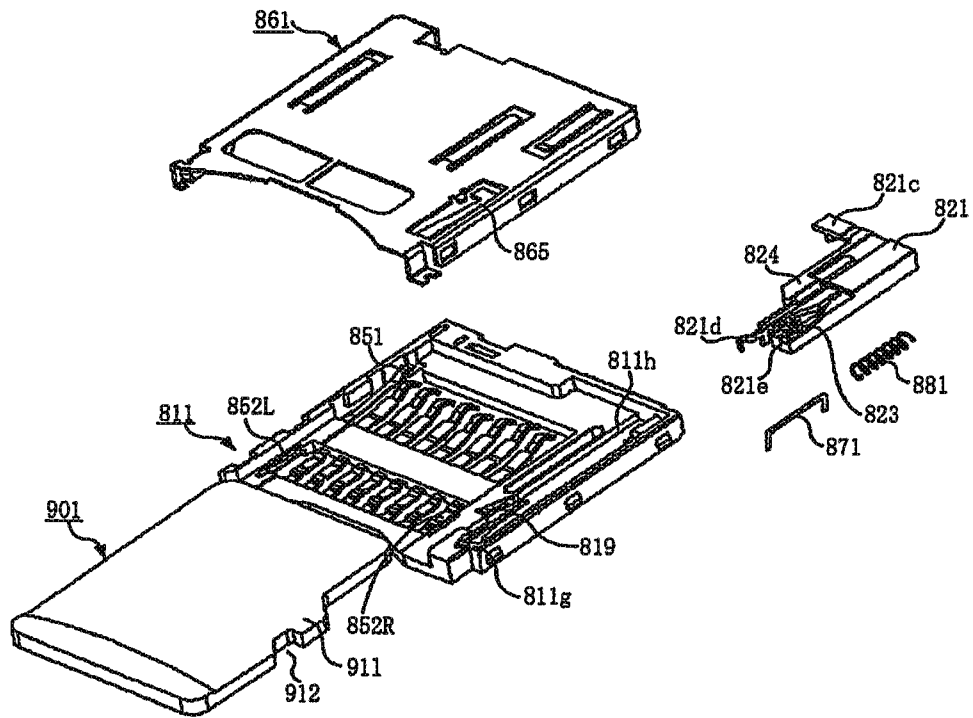


FIG. 7



Prior art

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/026302

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R13/635 G06K13/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/208804 A1 (KIKUCHI KOUJI [JP] ET AL) 22 September 2005 (2005-09-22) * abstract; figures 19-26 paragraph [0115] - paragraph [0134] -----	1-4, 7, 8, 11
X	EP 1 577 827 A1 (JAPAN AVIATION ELECTRON [JP]) 21 September 2005 (2005-09-21) * abstract; figures 2-6 paragraph [0011] - paragraph [0025] -----	1, 8, 10, 11
A	US 2007/202750 A1 (NISHIWAKI KENJI [JP] ET AL) 30 August 2007 (2007-08-30) * abstract; figures 1-4 paragraph [0022] - paragraph [0031] -----	1
A	US 2007/178733 A1 (SADATOKU HIROKI [JP]) 2 August 2007 (2007-08-02) * abstract; figures 1-6 paragraph [0043] - paragraph [0066] -----	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

29 July 2010

Date of mailing of the international search report

09/08/2010

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Serrano Funcia, J

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/026302

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005208804	A1	22-09-2005	JP 4054022 B2 27-02-2008
			JP 2005301983 A 27-10-2005
			US 2006205281 A1 14-09-2006
EP 1577827	A1	21-09-2005	CN 1671005 A 21-09-2005
			DE 602005001163 T2 17-01-2008
			JP 4007969 B2 14-11-2007
			JP 2005268089 A 29-09-2005
			US 2005208805 A1 22-09-2005
US 2007202750	A1	30-08-2007	CN 101071910 A 14-11-2007
			JP 2007227215 A 06-09-2007
			KR 20070088344 A 29-08-2007
US 2007178733	A1	02-08-2007	JP 4473226 B2 02-06-2010
			JP 2007200815 A 09-08-2007
			KR 20070078771 A 02-08-2007